Brandon Schnedar
25821724

Question #1

EECS101: HW #1

1 a.

$x' = \frac{f'x}{z}$, $x = x_0 + ta$, $z = z_0 + tc$, $y' = \frac{f'y}{z}$, $y = y_0 + tb$

Pers

$$\boxed{x' = \frac{(x_0 + ta)}{(z_0 + tc)} f' \qquad y' = \frac{(y_0 + tb)}{(z_0 + tc)} f'}$$

ortho

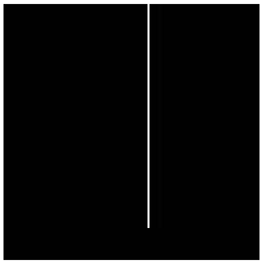
$$\boxed{x' = x_0 + tA \qquad y' = y_0 + tB}$$

b. No, the perspective projection is not a line. The line becomes dotted and unconnected. Therefore not a line

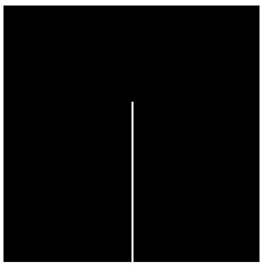
c. ~~No~~ yes, The image shows a ~~[illegible]~~ line that is continous.

e. At t goes to ∞ we will reach a vanishing point and the line will disaper. The slowly get farther and farther apart in the image as time continues, at some point they should disaper entirely.

Perp



Ortho



Question #2

② a.

$x_1' = x_1 + tA$

$\hat{x}_2' = x_2 + tA$

$y_1' = y_1 + tb$

$\hat{y}_2' = y_2 + tb$

orth

Perp

$x' = \frac{x_1 + tA}{z_0} f'$

$\hat{x}' = \frac{x_2 + tA}{z_0} f'$

$y' = \frac{y_1 + tA}{z_0} f'$

$\hat{y}' = \frac{y_2 + tA}{z_0} f'$

c. will they give Parallel?

The z plane needs to ~~be~~ be the Same or Very close to show if two Parallel lines are Parallel

Perp $m = -\frac{f}{z_0}$ $\quad -\frac{1}{-1} \quad -\frac{1}{-2} \quad -\frac{1}{-3}$

$z_0 = -1 \quad z_0 = -2 \quad z_0 = -3$

ortho $m' = -\frac{f}{z'} = -\frac{f}{z_0} = \frac{1}{-1}, \quad \frac{1}{-2} \quad \frac{1}{-3}$

$z_0 = -1, \quad z_0 = -2 \quad z_0 = -3$

Since magnification is the same for ortho/Perp and ortho will always show Parallel lines when ...

$\hat{y}_2' = y_2 + tb$ $\qquad\qquad$ $y' = \frac{y_p + tA}{z_0} f'$

orth $\qquad\qquad$ $\hat{y}' = \frac{y_2 + tA}{z_0} f'$

c. will they give Parallel?

The z plane needs to ~~be~~ be the Same or very close to show if two parallel lines are Parallel

Perp $m = -\frac{f}{z_0}$ $\qquad -\frac{1}{-1} \quad -\frac{1}{-2} \quad -\frac{1}{-3}$

$z_0 = -1 \quad z_0 = -2 \quad z_0 = -3$

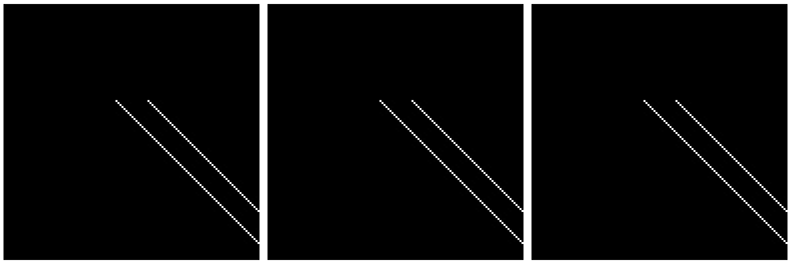
ortho $m' = -\frac{f}{z'} = \frac{-f}{z_0} = \frac{1}{-1}, \frac{1}{-2}, \frac{1}{-3}$

$z_0 = -1, \quad z_0 = -2, \quad z_0 = -3$

Since magnification is the same for ortho/Perp and ortho will always show Parallel lines when given a parrallel lines, So long as ortho is parallel, perp will be parralel in this situation. M only depends on Z and both ortho/Perp share a z coord here

Ortho images

Z= -1 Z= -2 Z= -3



Perp Images in the same order

Z= -1 Z= -2 Z= -3

Question #3 and the remainder of #2

2 D. yes, all the Perp & ortho images are Parallel like Part C Suggests

e. The orthographic Projection is a good aproximation.

$\grave{X}_o = 0.5 + t$

$\grave{x}p \frac{0.5+t}{-1} \cdot f$

Same as

In many cases they have, Perp & ortho, the same values like in the when $Z = -1$. The $-Z$ just mirrors them and since they are semi symetric Parralel lines it works.

So when $Z_o = |f'|$ then ortho & Perp becomes the Same.

(3) Ortho

A. $\grave{x} = x_1$ $\grave{y} = y_o + tb$

$\hat{\grave{x}} = x_2$ $\hat{\grave{y}} = y_o + tb$

Perp

$$\grave{x} = \frac{x_1}{z_o + tc} f'$$

$$\hat{\grave{x}} = \frac{x^2}{z_o + tc} f'$$

$$y' = \frac{y_o + tb}{z_o + tc} f'$$

$$\hat{y}' = \frac{y_o + bb}{z_o + tc} f'$$

b) $m = \frac{-f}{z}$ $\quad 1 \cancel{z}$ $\quad m = \frac{-f}{\cancel{z_0} + t_c}$ $\quad m = -1 \text{ \& } 1$

$x' = x_1$ $\qquad x_1' = \frac{x_1}{z_0 + t_c} f_1$ $\qquad f = 1$

~~$y = y_0 + tb$~~

$y' = y_1$ $\qquad y_1' = \frac{x_1 + tb}{z_0 + tb} = 0$

$z = z_0 + tc$

$z = -1 \text{ \& } 1$ $\qquad \frac{-y + t_0}{z_0 + tc} = \frac{}{tc}$

d) yes {Some lines may be flipped since $m = -1$ & 1, one will give a mirror, but -1 will flip the line which may result in non parallel lines unless they are symetric}

Some of them (all) are flipped over the x-axis as predicted in part B.

f) as t goes to ∞ x & y go to $\emptyset$

meaning all x, y, z points are $(0,0,0)$

meaning they converge and no longer parallel

Ortho

C = 1

B = 0 B = 1 B = -1

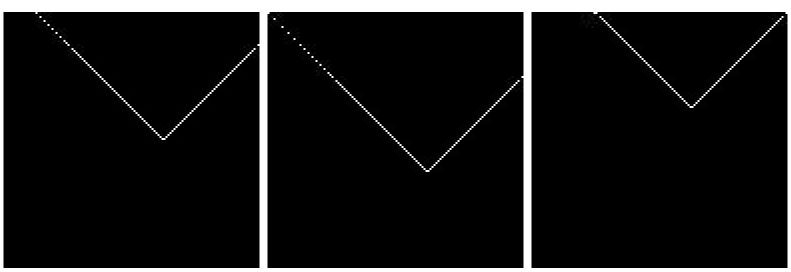
C = -1

B = 0 B = 1 B = -1

Perp

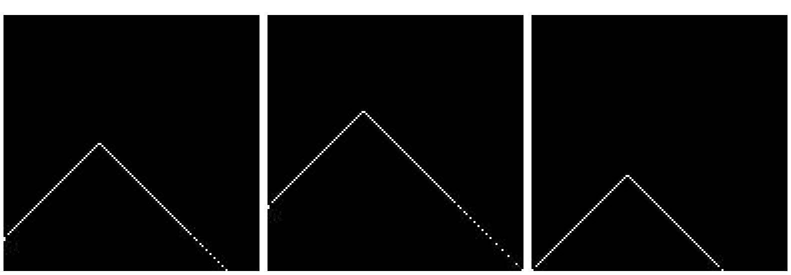
C = 1

B = 0 B = 1 B = -1



C = -1

B = 0 B = 1 B = -1



Extra Credit:
fopen(), opens a file to be read or written. It does this by the user inputing “rb” read or “wb.” write.

fread(): Reads from a file, the inputs tell it where to read

fclose(): Closes an opened file that the code was perviously reading or writing.

header(): The header takes the previous title of the given image and converts it in a way that it can be used in the ras file by using little-endian or big endian depending on the system.

clear(): Clear takes the images memories space and clears out any of the memory that may be defined. It does this by going through every memory slot and setting them to Zero.

fwrite(): writes what is given in to the specificed file it is given. The coordinated inputs tell it where to put the new data.

main(): Main converts a raw image to a ras image. It does this by opening a file, it checks to see if it can be opened first and if it is the right size, converts the header of the file and then raw file into a ras file.